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Self-Injurious Behavior and Stereotypy in an Institutionalized Mentally Retarded Population

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Demographic variables and behavioral characteristics of institutionalized mentally retarded clients exhibiting both self-injurious behavior (SIB) and stereotypy, stereotypy alone, SIB alone, or neither of these behaviors were analyzed. Overall, there were no significant differences for the demographic variables measured. Multivariate analyses revealed that severity and frequency of behavior, sensory handicap, and sex of the subject were the best predictors of group membership. Moreover, this research suggests that SIB and stereotypy can be classified as stereotyped SIB and withdrawal stereotypy, respectively. Thus, the treatment modalities presently being applied to these behaviors could be inappropriate. Additional evidence is discussed that supports the belief that an organic physiological substrate or mechanism could be related to these aberrant behavior patterns, which would necessitate a new diagnostic classification and alternative forms of treatment.

Self-injurious behavior (SIB) and stereotypy are frequent behaviors among mentally retarded individuals. Unfortunately, there is no consensus as to the classification of, or the relationship between, these behaviors. For instance, self-stimulatory behavior has been described as both self-injurious and stereotyped behavior (Carr, 1977; Lemke, 1974; Luiselli, Pemberton, & Helfen, 1978). However, other researchers have classified stereotypy as a type of SIB

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(Baumeister & Forehand, 1973; Corbett, 1975). Because stereotypy is often found to precede and have elements in common with SIB, other investigators have suggested that SIB is a consequent or damaging form of stereotypy (DeLissovoy, 1961; Rincover, 1978; Schroeder, Schroeder, Smith, & Dalldorf, 1978; Wells, Forehand, Hickey, & Green, 1977).

The relationship between SIB and stereotypy is not agreed upon, partly because the etiology and treatment of such behavior are so poorly understood. Even though these behaviors can be viewed as independent and separate because of the phenotypic differences between them, both might be related to an attempt to induce arousal or stimulation or to provide homeostatic balance. In this context, SIB can be reviewed as an extension or radical expression of stereotypy (De Lissovoy, 1961; Rincover, 1978; Schroeder et al., 1978; Wells et al., 1977). As stereotypic stimulation-seeking habituates, more heroic self-stimulatory behaviors such as SIB might evolve. Thus, similar mechanisms, varying in degree, could subserve these two dramatic behavioral aberrations. Further support for this possibility derives from a recent study by Barron and Sandman (1983). Based upon the observation that naloxone could attenuate SIB (Sandman et al., 1983), it was reasoned that response to sedative-hypnotics might be unusual in patients with SIB or stereotypy. Indeed, nearly 70% of the patients with both SIB and stereotypy exhibited a *paradoxical* response to these medications. The incidence of paradoxical response diminished to approximately 35% if patients exhibited only SIB or stereotypy, and to 0% in the control patients.

The present study is an extension of the earlier Barron and Sandman (1983) study, designed to determine additional similarities and differences in the behavioral profiles of clients with SIB and/or stereotypy.

METHODS

Subjects

The subjects consisted of 100 mentally retarded clients (60 males, 40 females) from the Adolescent Development Program at Fairview Hospital, a state-operated residential facility for the developmentally disabled in Costa Mesa, California. Clients were divided into four different groups: (1) clients exhibiting both SIB and stereotypy, (2) clients with stereotypy but not SIB, (3) clients with SIB but not stereotypy, and (4) randomly selected clients displaying neither of these behaviors. The SIB and/or stereotypy exhibited by the clients in Groups 1–3 was currently identified as a problem behavior and had been identified as such for at least a 5-year period.

Definitions and Quantification of Variables

Self-injurious behavior. SIB was used to describe repetitive self-inflicted action by an individual, encompassing a number of behaviors and resulting in physical harm and tissue damage. In the present study, frequency of SIB (the number of times of each behavioral episode) was found to occur on a daily basis (at least once a day, but more than hourly), and the severity of SIB (the usual consequences of behavior) caused minor (scratches, abrasions, and minor bruises) to moderate (lacerations and swelling) injury. The mean frequency and severity of SIB recorded in this study would be considered severe, according to Schroeder et al.'s (1978) classification, because it occurred at least daily and caused bleeding, bruising, and other results. However, few clients in this study exhibited chronic, life-threatening injury to themselves, a finding which is consistent with the literature on severity of SIB (Carr, 1977).

Stereotyped behavior. Stereotyped behavior or stereotypy was used to describe persistent, highly repetitive, invariant motor acts that seem to have no apparent function and are not injurious to the individual. Findings from the present study revealed that stereotypy occurred on an hourly basis (at least once an hour) and caused no injury. There were no sex or group differences found between the mean frequency and the severity of the stereotypy emitted.

Antecedents of SIB and stereotypy. The event(s) that regularly preceded the client's specific behavioral episode were inferred and recorded by staff. The antecedent event sets the occasion for the response and could be a discriminative stimulus. For example, an episode of head banging could be related to a client's need for attention or a change of routine or to his or her experience of frustration.

Management response of SIB and stereotypy. The response(s) were identified in a formalized treatment plan and implemented by staff to bring the client's behavioral episode under control. For example, an episode of head banging could not only require staff to use instructional control and instructional gestural responses but also, if the severity is great enough, the management response could require contingent restraint.

Design

Four groups were generated from a population of 100 clients, based upon the presence or absence of self-injurious or stereotypic behavior. Thus a 2 (SIB) $\times$ 2 (Stereotypy) statistical design was developed to test factors that might differentiate these groups.

Procedure

Group demographic and descriptive information was obtained from a behavioral survey checklist/questionnaire and analyzed in accordance with the following method. The behavior checklist/questionnaire consisted of 44 items adapted from a recently revised Fairview Problem Behavior Checklist. There were 22 items that represented each of the behavior patterns under investigation. Structured interviews were conducted over a 2-month period with staff most familiar with each client's history. In most cases, the interviewees were the client's AM group leaders. Clients' charts were used for additional information. The survey items are presented in Table 1.

The checklist/questionnaire consisted of three major categories.

1. Demographic and background information: name, Fairview identification number, residence number, chronological age, sex, admitting date, diagnosis, and mental age.
2. History of self-injurious behavior: topology, frequency, severity, antecedent or provoking events, response ratings, and management response (treatment).
3. History of stereotypy or rhythmic movements: topology, frequency, severity, antecedent or provoking response ratings, and management response (treatment).

The general instructions and scoring information have been adapted from a revised variation of the Fairview Problem Behavior Record (Ross, 1971). Interrater reliability of this instrument is .94, and the intrarater estimate is .88.

Method of Data Analysis

Two analyses were employed. In order to determine the effects of the independent variables, separate analyses of variance were conducted for the dependent variables; presence of sensory handicap, frequency of the behaviors scored, and severity of the behaviors scored. Secondly, chi square (χ^2) tests were performed to assess whether an association existed among experimental groups, demographic variables, topology of behavior, antecedents, and management response.

RESULTS

Of the 100 clients, 22 were classified as exhibiting both SIB and stereotypy (Group 1), 40 exhibited stereotypy but not SIB (Group 2), 18 exhibited SIB but not stereotypy (Group 3), and 20 served as controls displaying neither of these behaviors (Group 4).

TABLE 1
Checklist of Self-Injurious and Stereotypy Behavior Survey Items

SURVEY ITEMS	
SELF-INJURIOUS BEHAVIORS	*STEREOTYPIC BEHAVIORS*
1. Threatens (verbal/gestural) self-abuse	23. Behaves compulsively/repetitively or with repetitive movement patterns, e.g., straightens furniture
2. Bites/chews/tears self	24. Flaps, flicks, or manipulates hands, fingers, or feet
3. Hits (closed fisted) head	25. Flaps, flicks, twirls, or spins objects
4. Slaps (open fisted) head	26. Mouths or sucks inedible objects
5. Hits/punches (closed fist) self, other than on the head	27. Twirls, spins, or whips entire body
6. Slaps/smacks (open fist) self, other than on the head	28. Rocks body
7. Snaps neck	29. Rocks head
8. Scratches self with hand or object	30. Rolls head
9. Puts inappropriate objects in own ears, nose, etc.	31. Paces floor
10. Pinches self	32. Rubs, pats, mouths or stimulates body parts (other than genitals, e.g., eye-rubbing)
11. Pulls, tears, or twists own hair	33. Contorts face (twitches, ticks, grimace, etc.)
12. Picks at own sores	34. Stares at hands
13. Uses objects as weapons to hurt self (other than 8 or 9)	35. Deliberately rolls or crosses eyes
14. Pulls own tubes	36. Stereotypically vocalizes
15. Smothers self	37. Self-initiates own restraint
16. Burns self	38. Postures rigidly (for at least 15 seconds)
17. Cuts self	39. Deliberately snorts or coughs
18. Attempts suicide	40. Deliberately ruminates or regurgitates
19. Pokes or gouges own eyes with fingers or objects	41. Deliberately holds breath (aerophagia)
20. Bangs self (e.g., head) against objects (floor, wall, chair)	42. Deliberately hyperventilates
21. Voluntarily falls or throws self on wall, floor, objects, etc. (other than item 19)	43. Deliberately induces seizure
22. Other	44. Other

Clients ranged in age from 9 to 26 years, with a mean of 20.71 and standard deviation of 3.60. Average length of institutionalization was 13.13 years. The most frequent medical diagnoses were mental retardation due to: unknown prenatal influence, other, defective fetal development (32%); chromosomal abnormality, G group, Down's syndrome, Trisomy G (9%); and trauma or physical agent, perinatal hypoxia (7%). The population consisted of 14% severely mentally retarded and 86% profoundly mentally retarded clients. The mental ages ranged from 12 to 56 months, with a mean of 24.78 and standard deviation of 9.75. There were no significant correlations found among subject group and sex, age, length of institutionalization, level of retardation, and mental age. These data are displayed in Table 2.

TABLE 2
Sex, Age, Length of Institutionalization, Level of Retardation, and Mental Age of the Clients From Each Experimental Group

	Group 1 SIB and Stereotypy		Group 2 Non-SIB and Stereotypy		Group 3 SIB and Non-Stereotypy		Group 4 Non-SIB and Non-Stereotypy		
Variable	Male	Female	Male	Female	Male	Female	Male	Female	Population TOTAL
N	10	12	24	16	13	5	11	9	100
Age (mean years)	21.5	24.0	24.1	18.8	21.2	18.4	19.0	19.1	20.7
Length of institutionalization (mean years)	14.6	12.0	15.5	11.4	11.21	12.6	12.7	12.0	13.1
Level of retardation (%)									
Severe	20.0	8.3	20.8	12.5	23.0	0.0	18.2	11.1	14.0
Profound	80.0	91.7	79.2	87.5	77.0	100.0	81.8	88.9	86.0
Mental Age (mean months)	24.1	22.6	27.8	22.6	27.8	18.3	26.0	22.1	24.78

Experimental Group and Topology

For the clients who exhibited SIB and stereotypy (Group 1) and only SIB (Group 3), there were no significant associations found for type and number of SIBs. In Figure 1a, the percentages, by group, of the most frequent types of SIB are displayed.

Clients who exhibited stereotypy and SIB (Group 1) and only stereotypy (Group 2) did not differ in the variety of stereotypic behavior emitted (Figure 1b). However, females tended to engage in fewer types of stereotypy than males ($\chi^2 = 12.27$; df = 1; $p < .001$).

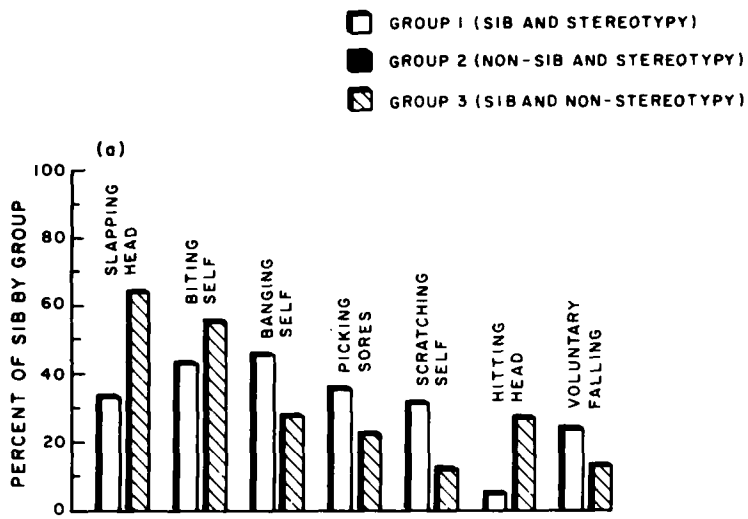

FIGURE 1a. Percentage of each group's most frequent type of SIB.

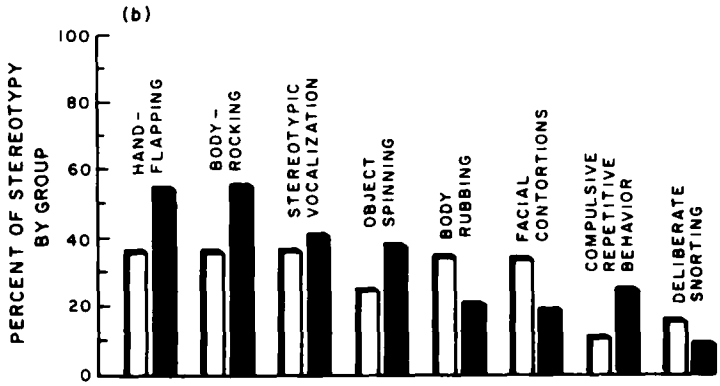

FIGURE 1b. Percentage of each group's most frequent type of stereotypy.

Experimental Group and Severity and Frequency

The mean frequency (number of times of each behavioral episode) and the severity (the consequences of behavior) of SIB and stereotypy also were not significantly different among the clients in the SIB groups (Group 1 and 3) for either frequency or severity. Furthermore, there were no significant differences reported among the clients in the stereotypy groups (Groups 1 and 2) for either frequency or severity. These data are summarized in Table 3. Females engaged in SIB significantly less often ($t = 2.21$; $df = 58$; $p < .05$), and the consequences of their behavior were less severe, as compared with male SIB. This relationship was not significant for stereotypy.

Experimental Group and Antecedents

The percentages by group of the most frequently reported antecedents are presented in Figure 1c. "Unknown" was reported more often as a preceding event for stereotypy and less often for SIB ($\chi^2 = 76.52$; $df = 2$; $p < .001$). Although not reaching statistical significance, "not wanting to do something" was the most common antecedent for clients evincing SIB only.

There was a significant association found between sex and number of antecedents. More antecedents were reported as preceding female than male SIB and/or stereotypy ($\chi^2 = 5.72$; $df = 1$; $p < .05$). Further, "unknown" or conjectured antecedents were more often reported for females than for males. Females in Group 1 displayed SIB and stereotypy because of nervousness ($\chi^2 = 4.09$; $df = 1$; $p < .05$), peer behavior ($\chi^2 = 4.28$; $df = 1$; $p < .05$), or for "other" reasons ($\chi^2 = 6.20$; $df = 1$; $p < .05$), as compared with males in this group. The "other" reason most often cited by staff was menstruation. In Group 2, noise (environmental) more often preceded female than male stereotypy ($\chi^2 = 8.20$; $df = 1$; $p < .05$). In Group 3, "unknown" was listed as the antecedent for the SIB of 19% of the males, as compared with only 2% of the females ($\chi^2 = 14.02$; $df = 1$; $p < .001$).

Experimental Group and Management Response

The management response (the usual response required by staff to bring the behavior under control) also was surveyed. In all groups, the most common management response was verbal/gestural instructional control. This response was used 35%, 40% and 27% of the time in Groups 1, 2, and 3, respectively.

The percentages by group of the most frequent types of management response used to control SIB and/or stereotypy are presented in Figure 1d. There were three significant associations found between group and type of management response. Extinction (ignoring) was used significantly more often

TABLE 3
Mean Frequency and Severity of SIB and Stereotypy of Each Experimental Group

Experimental Group	Mean Frequency	Mean Severity
SIB and	5.00	2.21
Stereotypy	5.53	1.11
Stereotypy	5.74	1.04
SIB	5.09	2.22

1 = Rarely (once a year)/no injury
2 = 2-11 times a year/minor injury
3 = At least once a month/moderate injury
4 = At least once a week/severe injury
5 = At least once a day/life threatening
6 = At least once an hour

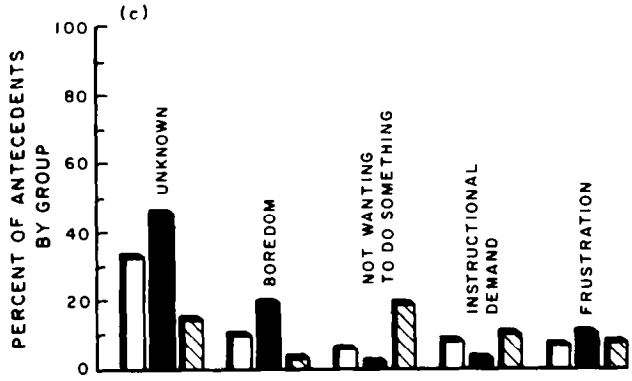

FIGURE 1c. Percentage of each group's antecedent behaviors. (See Figure 1a for key.)

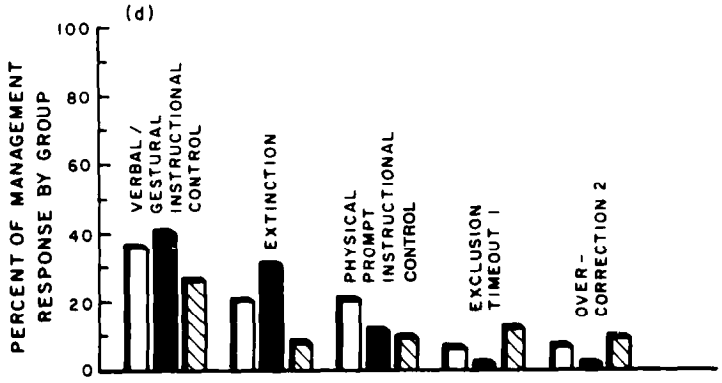

FIGURE 1d. Percentage of each group's most frequent management response. (See Figure 1a for key.)

for treating stereotypy than SIB ($\chi^2 = 39.8$; df = 2; $p < .05$). Exclusion time-out and overcorrection were used significantly more often for SIB than stereotypy ($\chi^2 = 13.35$; df = 2; $p < .001$) and ($\chi^2 = 16.76$; df = 2; $p < .001$), respectively. There was also a significant association found between group and mean number of management responses ($\chi^2 = 8.19$; df = 2; $p < .01$). More management responses were reported for Group 1 (SIB and stereotypy). However, this difference is probably related to the fact that a greater number of behaviors were described for this group.

There were three significant within-group differences between sex and type of management response. In Group 1, 6% of the males received contingent restraint upon displaying SIB, whereas none of the females received such response ($\chi^2 = 8.03$; df = 1; $p < .01$). For Group 2, 7% of the males, compared with none of the females, received withdrawal of social contact in response to their stereotypy ($\chi^2 = 4.18$; df = 1; $p < .05$). Lastly, in Group 3, 15% of male SIB was managed with physical force (overcorrection 2), while none of the females received such treatment ($\chi^2 = 9.30$; df = 1; $p < .05$).

In order to determine other effects of SIB and stereotypy, a two-way analysis of variance was conducted on the following variables: (a) presence of sensory handicap(s), (b) frequency of SIB and/or stereotypy, (c) severity of SIB and/or stereotypy.

Significantly more hearing and/or visual impairments appeared among the clients exhibiting stereotypy ($F = 6.71$; df = 3, 96; $p < .05$), and the behaviors that they emitted occurred at a higher rate ($F = 1151.79$; df = 3, 96; $p < .001$). The findings suggest that stereotypy is significantly related to sensory handicap and frequency of behavior.

DISCUSSION

Maisto, Baumeister, and Maisto (1978) found SIB to be more prevalent among female residents, younger aged residents who had been institutionalized longer, and those who were severely and profoundly mentally retarded. In the present study, there were no significant differences recorded for demographic variables between clients who emit SIB and/or stereotypy and those who display neither of these behaviors. These data confirm Schroeder et al.'s (1978) findings that self-injurers do not differ on these dimensions and extend them to include clients evincing stereotypy.

Self-biting and head banging have been reported as the most frequently occurring behaviors among those who emit SIB (Maisto et al., 1978; Soule & O'Brien, 1974; Whitney, 1971). Findings from the present study are consistent with these data for Group 1; however, head slapping and self-biting were the most frequent forms of self-abuse exhibited by the group with SIB only (Group 3). Thus, these data might be suggesting, in accordance with previous findings (Barron & Sandman, 1983), that substantive differences exist between these two groups of clients, both of which emit SIB.

Previous studies have suggested that gender is related to the prevalence and topology of SIB. Soule and O'Brien (1974) found that the percentage of females performing SIB was higher than the percentage of males who performed SIB. Further, Maisto et al. (1978) reported that females are more likely to engage in self-biting and multiple SIBs, whereas male institutionalized mentally retarded residents are more likely to exhibit head banging and single and multiple SIBs about equally. However, in the present study, there were no differences between sex of client and type and number of SIBs identified. These findings are similar to the results of Smeets (1971) and Schroeder et al. (1978).

Even though there were no significant differences between the mean frequency and the severity of SIB emitted by clients from both SIB groups, females engaged in SIB less frequently, and the consequences of their behavior were less severe, as compared with male SIB. This latter finding confirms Maisto et al.'s (1978) observation that females tend to exhibit milder degrees of SIB than males.

Pohl (1976) has found that body rocking is the most dominant stereotypic motor act exhibited by mentally retarded clients. In the present study, body rocking and hand flapping were performed at similar frequencies for both stereotypy groups, with the higher number of these behaviors reported for the stereotypy only group (Group 2). The finding that these two types of stereotyped behaviors are related to the SIB exhibited by Group 1 supports other results (Maisto et al. 1978). Further, this study suggests that there are significant differences between sex and type and number of stereotyped behaviors identified, because males performed more multiple types of stereotypy than females.

The majority of SIB and stereotypy emitted by clients in this study can be construed to be similiar to stereotyped SIB (Napolitan, 1979) and withdrawal stereotypy (Stone, 1964), respectively. Such behavior appeared to be motivated by what Carr (1977) has described as intrinsic reinforcement, because antecedents of this behavior could not be reliably ascertained. Intrinsic reinforcement cannot be controlled by other individuals, because it is self-stimulating and homeostatic in nature, or related to some type of organicity. According to Carr, the treatment of SIB and stereotypy under these conditions consists of an attempt to negate or attenuate the reinforcers themselves (e.g., enriching the environment and utilizing sensory extinction procedures or medical intervention). Thus, treatment procedures based on extrinsic reinforcement, positive and negative reinforcement that is manipulated by other individuals, cannot be applied effectively to the most common forms of SIB and stereotypy as described in this study.

One implication from this research suggests that effective treatment modalities should be matched to the putative etiological factors maintaining maladaptive behaviors. For instance, evidence from the Sandman et al. (1983) and Barron and Sandman (1983) investigations suggests that a biological

substrate or mechanism, that is, an impaired endogenous opiate system, might contribute to a type or syndrome of SIB that involves stereotypy. This implies that an effective strategy for treating clients with this syndrome could be endogenous opiate antagonists, MSH/ACTH fragments, or MSH-inhibiting factors. Thus, clients with behaviors that are maintained by intrinsic reinforcers might require new forms of intervention. Presently, it appears that future research is needed to differentiate subgroups of clients with SIB and stereotypy, in order to properly match treatment with the disorder.

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